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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/387,164	08/31/1999	YONGJUN HU	303.607US1	2253

7590

11/06/2002

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EXAMINER

ROY, SIKHA

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 11/06/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/387,164

Applicant(s)

HU, YONGJUN

Examiner

Sikha Roy

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Acknowledgement is made of the Response (Paper # 8) which has been entered on August 14, 2002.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 3-22,27-36 are rejected under 35 U.S.C. 102(e) as being anticipated by U. S. Patent 6,130,106 to Zimlich.

Regarding claim 3 Zimlich discloses (column 1 lines 39-48, column 2 lines 20-39 figs. 2,3) a field emission display comprising electron emitters having ion-implantation. Implanting ions in an appropriate manner an emitter with a maximum desired current is produced, the implantation lowering the potential and hence enhancing electron emission. The limitation reciting the implantation layer lowering the potential barrier is functionally inherent to the emitter.

Regarding claim 5 Zimlich discloses that the current is limited by the construction of the emitter itself and hence the emitter having ion-implantation produce electrons at a predetermined energy level (current limited to a specific threshold).

Regarding claim 7 the limitation reciting the implantation layer affecting the image force so as to enhance the releasing of electrons is functionally inherent to the emitter.

Regarding claim 9 Zimlich discloses the field emission display with emitters having an implantation. The limitation reciting the implantation layer enhancing the Schottky effect so as to enhance the releasing of electrons is functionally inherent to the emitter.

Regarding claim 11 Zimlich discloses the field emission display with emitters having an implantation layer. The limitation reciting the implantation layer decreasing the dielectric effect so as to enhance the releasing of electrons is functionally inherent to the emitter.

Claims 13 and 15 recite the same limitation as of claims 3 and 5 , the emitter having implantation layer (n-type silicon layer)³⁸ (Fig. 3) in the tip of the emitters (column 2 lines 46,47). Regarding the limitation comprising the implantation layer limits outgassing Zimlich discloses (column 1 lines 44-47) a next implantation step provides a more heavily doped n-type region where the tips of the emitters will be formed to reduce the work function with the effect of reducing outgassing.

Claims 17,19 and 21 essentially recite the same limitation as of claims 7,9 and 11 respectively and hence are rejected for the same reasons.

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Referring to claims 4,6,8,10,12,16 and 20 Zimlich discloses (column 2 lines 40-46 Fig.7) that after the ion-implantation in the emitter is produced the structure is then preferably heated to cause the ions diffuse downwardly so that the layer is underneath the surface of the emitter.

Referring to claim 27 Zimlich discloses (column 3 lines 4-8, claim 12) an external coating of a thin film of a material formed on the emitter to reduce the work function of the emitters. The rest of the limitation is same as of claim 13 and hence is rejected for the same reason.

Claims 28 and 29 recite the same limitation as claims 3 and 5 and the limitation of external coating which has been disclosed by Zimlich and hence are rejected (see rejection of claims 3,5).

Claims 30,31 and 32 recite the same limitations as claims 7,9 and 11 respectively and the limitation of external coating which has been disclosed by Zimlich and hence are rejected (see rejection of claims 7,9,11).

Regarding claim 33 Zimlich discloses a field emission display device (Fig.1, column 2 lines 1-15) comprising emitters 16 having ion implantation which produces current at a desired level, reduces potential barrier enhancing electron emission yielding maximum current and reduces work function and inhibits degradation by reducing outgassing. Zimlich further discloses a light-emitting target layer 26 that radiates when released electrons strike the light-emitting target.

Regarding claims 34 and 35 Zimlich discloses phosphor particles 28 over the pixel regions in the light-emitting target layer 26.

Regarding claim 36 Zimlich discloses (column 3 lines 9-25) knowing the maximum emission current, the maximum number of ions and hence maximum implantation in the emitter can be calculated and this emitter can be used in Video Graphics Array.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1,2,23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent 6,130,106 to Zimlich in view of U. S. Patent 5,311,055 to Goodman et al.

Regarding claim 1 Zimlich discloses implantation by ions such as arsenic, antimony or phosphor. Zimlich does not disclose an implanted oxide layer.

Goodman et al. in pertinent art of semiconductor transistor emitters disclose (column 7 lines 7-30, Fig.5) a thin sacrificial oxygen implantation pattern is produced by implanting the emitter region with oxygen by well-known SIMOX process.

The selection of known material for a known purpose is generally considered to be within the skill of the art. It would have been obvious to one of ordinary skill in the art at the time of invention to use oxygen for ion implantation for the emitter of Zimlich as

suggested by Goodman et al. for selection of known material for a known purpose is considered to be within the skill of the art.

Regarding claim 2 Zimlich discloses the implanted layer reduces work function and hence inhibits outgassing.

Referring to claims 23 and 24 Zimlich in view of Goodman et al. disclose oxygen ion implantation producing silicon oxide layer and releasing electrons at a predetermined energy level.

Claims 25 and 26 essentially recite the same limitation as of claim 23 and hence are rejected for the same reason (the embedded layer being same as implanted layer).

Referring to claims 14,18 and 22 Zimlich discloses the claimed invention except for the implantation layer being embedded in the surface of the emitter. It would have been an obvious matter of design choice to have the implanted layer embedded in the surface of the emitter as the Applicant has not disclosed that this solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with the implantation layer embedded under the surface of the emitter.

Response to Arguments

Applicant's arguments with respect to claims 1-35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U. S. Patent 4,386,968 to Hinkel et al., U. S. Patent 4,801,994 to Van Gorkom et al. and U. S. Patent 5,420,054 to Choi et al. disclose semiconductor emitters with ion implantation formed on silicon wafers.

Contact Information

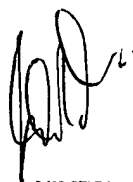
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (703) 308-2826. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (703) 305-4794. The fax phone number for the organization is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

S.R.

Sikha Roy
Patent Examiner
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